

## PATENT CLAIMS

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1. Position sensor according to the transit time principle of a mechanical-elastic wave with

- a waveguide (3)
- a detector coil (5) arranged on the waveguide (3),
- 10 - a position element, i.e. a position magnet (28), which can be moved along the waveguide (3)

characterized in that

- the waveguide (3) is made of electrically conductive material,
- the detector coil (5) in the detector range is arranged coaxially on the
- 15 waveguide (3) and
- the detector coil (5) is assigned to a flux guide unit (30).

2. Position sensor under Claim 1,

characterized in that

- 20 the waveguide (3) possesses a solid cross-section.

3. Position sensor under one of the preceding claims,

characterized in that

- the cross-section of the waveguide (3) in particular is solid throughout the entire
- 25 measurement range.

4. Position sensor under one of the preceding claims,

characterized in that

- the detector (5) is also a part of a detector arrangement just like a detector circuit
- 30 (50).

5. Position sensor under one of the preceding claims,  
characterized in that  
the flux guide unit (30) of the detector coil (5) is assigned so that it simultaneously  
shields the detector coil (5) against undesired external magnetic fields.
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6. Position sensor under one of the preceding claims,  
characterized in that  
the magnetic flux path of the magnetic flux enabled by the flux guide unit (30)  
encloses the windings of the coil at least once, in particular including the  
10 waveguide (3) in the flux path.
7. Position sensor under one of the preceding claims,  
characterized in that  
the flux path enabled by the flux guide unit (30) surrounds the entire coil, in  
15 particular in at least one layer, in particular at least one axial layer, in particular  
surrounding the coil completely.
8. Position sensor according to the transit time principle of a mechanical-elastic  
wave with
- 20 - a waveguide (3)  
- a detector coil (5) arranged on the waveguide (3),  
- a position element, i.e. a position magnet (28), which can be moved along  
the waveguide (3)  
- an electrical return (6),
- 25 in particular under one of the preceding claims,  
characterized in that  
at least in the axial range of the detector coil (5) of the return (6) is coaxially  
arranged externally around the detector coil (5).
- 30 9. Position sensor under Claim 8,  
characterized in that  
the return (6) consists of electrically conductive and also magnetic shielding  
material with a permeability of  $\mu > 1$ .

10. Position sensor under Claim 9,  
characterized in that

The return (6) exhibits an extensively as possible, in particular completely  
5 enclosed cross-section.

11. Position sensor under one of the preceding claims,  
characterized in that

the shielding, in particular the flux guide unit (30), encloses the detector coil (5) at  
10 least partially, in particular along the layer, in particular an axial layer of the  
detector coil (5), in particular coaxially encloses.

12. Position sensor under one of the preceding claims,  
characterized in that

15 the detector coil (5) is constructed as a self-supporting coil without coil shell.

13. Position sensor under one of the preceding claims,  
characterized in that

the detector coil (5) is wrapped on a coil shell, in particular a H-shaped coil shell in  
20 the longitudinal view.

14. Position sensor under one of the preceding claims,  
characterized in that

the shielding, in particular the flux guide unit (30), completely encloses the  
25 detector coil (5) except for the opening (5a) for the waveguide (3) as well as at  
least on guide opening (5b) for the electrical conductors connected to the detector  
coil (5).

15. Position sensor under one of the preceding claims,  
30 characterized in that

the flux guide unit (30c) is primarily shell-shaped, in particular cylindrically shaped  
with two openings opposing openings in the enclosed front side (5a, 5a') for entry  
and exit of the waveguide (3) and a conductor opening (5b) for the passage of the

electrical conductor for the detector coil (5), in which the conductor opening (5b) in particular is found in the cylindrical surface area of the flux guide unit (30).

16. Position sensor under one of the preceding claims,  
5 characterized in that  
the cylindrical flux guide unit (30) consists of a cup-shaped body with an open front side and a suitable cover on this frontal opening.

17. Position sensor under one of the preceding claims,  
10 characterized in that  
the cylindrical housing consists of two half-cylindrical shells.

18. Position sensor under one of the preceding claims,  
characterized in that  
15 the flux guide component (30) consists of a ferromagnetic material with a permeability of  $\mu > 10$ , in particular  $\mu > 1,000$ , in particular  $\mu > 10,000$ .

19. Position sensor under one of the preceding claims,  
characterized in that  
20 the flux guide component (30) consists of a highly permeable alloy, in particular out of ferrite.

20. Position sensor under one of the preceding claims,  
characterized in that  
25 direct current is flowed through the waveguide (3).

21. Position sensor under one of the preceding claims,  
characterized in that  
the detector arrangement (105) does not include any magnets, in particular no  
30 bias magnets.

22. Position sensor under one of the preceding claims,  
characterized in that

the axial direction of the detector coil (5) corresponds with the longitudinal direction of the waveguide (3).

23. Position sensor under one of the preceding claims,  
5 characterized in that  
the detector coil (5) is a toroid coil.

24. Position sensor under one of the preceding claims,  
characterized in that  
10 axial length of the toroid coil at least corresponds to the diameter of its free central  
opening (5a), is preferably at least twice as large.

25. Position sensor under one of the preceding claims,  
characterized in that  
15 the toroid coil is enclosed by a flux guide unit (30), which has a somewhat  
cylindrical form and preferably consists of two half-shells, which are enclosed by a  
front side in each case, except for a central passage opening (5a), analogous to  
the passage opening of the toroid coil and its contact layer runs diagonally to the  
longitudinal axis of the toroid coil and the flux guide unit (30).